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December 7, 2012

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: Ex Parte Presentation in WT Docket No. 12-70, *Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-2200 MHz Bands*; ET Docket No. 10-142, *Fixed and Mobile Services in the Mobile Satellite Service Bands at 1525-1559 MHz and 1626.5-1660.5 MHz, 1610-1626.5 MHz and 2483.5-2500 MHz, and 2000-2020 MHz and 2180-2200 MHz*; and WT Docket No. 04-356, *Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands*

Dear Ms. Dortch:

Pursuant to Section 1.1206 of the Commission's rules, 47 C.F.R. § 1.1206, DISH Network Corporation ("DISH") submits this letter[1] summarizing a meeting on December 5, 2012, with Renee Gregory, Legal Advisor to Chairman Julius Genachowski; Ruth Milkman, Chief, Wireless Telecommunications Bureau ("WTB"); Julius Knapp, Chief, Office of Engineering and Technology ("OET"); Tom Peters, Chief Engineer, WTB (by telephone); John Leibovitz, Deputy Chief, WTB; Brian Regan, Legal Advisor, WTB; Blaise Scinto, Chief, Broadband Division, WTB; Mark Settle, Deputy Chief, Policy and Rules Division, OET; Peter Daronco, Associate Chief, Broadband Division, WTB; Jeremy Marcus, Assistant Chief, Broadband Division, WTB; Chris Helzer, Broadband Division, WTB; Janet Young, Broadband Division, WTB; Kevin Holmes, Broadband Division, WTB; Paul Malmud, WTB; Michael Ha, OET; and Matthew Pearl, Law Clerk, Broadband Division, WTB. Present on behalf of DISH were Stanton Dodge, Executive Vice President and General Counsel; Jeffrey Blum, Senior Vice President and Deputy General Counsel; Mariam Sorond, Vice President, Technology Development; Alison Minea, Corporate Counsel; and Hadass Kogan, Associate Corporate Counsel. Mr. Blum also had telephone calls on December 6, 2012 with Louis Peraertz, Legal Advisor, Wireless, International, and Public Safety for Commissioner Mignon Clyburn; David Goldman, Senior Legal Advisor for Commissioner Jessica Rosenworcel; and Mr. Knapp and Mr. Leibovitz.

[1] DISH notes that Sprint Nextel Corporation filed an ex parte letter dated December 6, 2012 that contains numerous misleading statements lacking technical justification. DISH will respond to that letter in a separate submission.

DISH suggests a compromise solution (described more fully below) that would effectively sacrifice the terrestrial use of 5 MHz of DISH's uplink spectrum to address the desire of the Commission to ensure flexibility in the future use of the H Block, while also addressing the desire of DISH to have the ability to use its remaining 15 MHz of uplink spectrum to the maximum extent possible and as quickly as possible. DISH's revised proposal offers the following benefits to both the AWS-4 proceeding and the anticipated H Block auction proceeding:

- Significantly increases the chance of a successful H Block high-power LTE auction;
- Provides greater certainty for the future H Block licensee;
- Provides more than sufficient protection to H Block high-power operations from AWS-4 operations;
- Provides greater regulatory and standards certainty for AWS-4 operations so DISH can attempt to enter the market as quickly as possible; and
- Provides sufficient safeguards so DISH can maximize the remaining 15 MHz of uplink spectrum.

DISH stressed that it stands ready to inject much needed investment and competition into the wireless industry, but its ability to enter the market quickly hinges, among other things, upon the Commission adopting final rules that keep the relevant technical standards substantially in place. DISH urges the Commission to adopt the out-of-band emissions ("OOBE") and in-band power levels that were proposed in the *AWS-4 NPRM*[2] with the following modification: to create added certainty for future licensees, DISH suggests that the Commission adopt an OOBE limit of -30 dBm/MHz (attenuation of 60 + 10*log(P) dB) for AWS-4 mobiles at 2000 MHz in the final AWS-4 rules. Substantial changes to these OOBE or in-band power levels apart from that one suggested modification would endanger DISH's entry into the wireless market by introducing serious regulatory and technical obstacles into DISH's planned deployment. Among other things, substantial changes to these OOBE or in-band power levels would likely result in the reopening of the 3rd Generation Partnership Project ("3GPP") standard-setting process for the AWS-4 band and the substantial delays associated therewith.[3] DISH's proposal would not require a change to the Band 23 blueprint for the chipset as defined by 3GPP, because DISH

[2] Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-2200 MHz Bands, WT Docket No. 12-70, Fixed and Mobile Services in the Mobile Satellite Service Bands at 1525-1559 MHz and 1626.5-1660.5 MHz, 1610-1626.5 MHz and 2483.5-2500 MHz, and 2000-2020 MHz and 2180-2200 MHz, ET Docket No. 10-142, Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands, WT Docket No. 04-356, *Notice of Proposed Rulemaking and Notice of Inquiry*, FCC 12-32, ¶ 33, 61 (rel. Mar. 21, 2012) ("*AWS-4 NPRM*").

[3] *See* Letter from Jeffrey H. Blum, DISH Network Corporation, to Marlene H. Dortch, Secretary, FCC, WT Dkt. Nos. 12-70 and 04-356 and ET Dkt. No. 10-142, at 2 (Dec. 3, 2012); Letter from Jeffrey H. Blum, DISH Network Corporation, to Marlene H. Dortch, Secretary, FCC, WT Dkt. Nos. 12-70 and 04-356 and ET Dkt. No. 10-142, at 1-2 (Nov. 26, 2012).

could satisfy the requirements through integration of an external duplexer. If DISH's proposal is not adopted, it is likely that the Band 23 blueprint for the chipset would need to be re-opened at 3GPP, and DISH's entry into the market would be subject to significant delay.

Recognizing that the Commission desires to retain flexibility with respect to the future use of the H Block, DISH has offered to voluntarily designate the lowest 5 MHz of its uplink spectrum (2000-2005 MHz) as an internal terrestrial guard band, provided that safeguards are adopted to ensure that the remaining 15 MHz of its uplink spectrum (2005-2020 MHz) can be utilized as fully and as quickly as possible for terrestrial mobile broadband. Specifically, in addition to adopting an OOBE limit of -30 dBm/MHz (attenuation of 60 + 10*log(P) dB) for AWS-4 mobiles at 2000 MHz, DISH is also proposing among other things that any forthcoming proceeding to adopt service rules for the H Block should conclude that the H Block operator must meet an OOBE limit of -49 dBm/MHz at 2005 MHz.

DISH's Proposal Will Effectively Protect a Full Range of Future H Block Operations

Based upon the current band plan, AWS-4 user equipment ("UE") transmissions would occur immediately adjacent to the proposed H Block device receive frequencies at 1995-2000 MHz. DISH's proposed internal terrestrial guard band at 2000-2005 MHz will provide frequency separation to protect H Block UE reception. This, in turn, will create additional value for the H Block by providing certainty that no terrestrial transmissions will occur (even at low power) in the first 5 MHz of the AWS-4 band, thus allowing H Block licensees to design their systems without accounting for low- or full-power AWS-4 operations on immediately adjacent frequencies. Additionally, if AWS-4 base station reception were permitted in 2000-2005 MHz, a similar obstacle will be presented to 3GPP at the 2000 MHz boundary. H Block transmissions would cause AWS-4 base station receiver blocking and spurious emissions interference. Debating technical solutions without frequency separation would cause considerable delay to finalization of the future H Block 3GPP specifications. This uncertainty in the standards process could affect the H Block auction participation. The DISH proposal, therefore, should create more value for H Block compared to other alternatives.

Additionally, DISH's proposed AWS-4 OOBE limit of -30 dBm/MHz at 2000 MHz will be sufficient to protect future H Block devices, given the low probability of interference and available technical mitigations. As a threshold matter, it is critical to highlight that device-to-device interference is probabilistic in nature, and many separate events (each with their own low probability) must occur simultaneously in order for an interference event to occur.

First, the H Block device must be located in an area with low downlink signal strength, near the device sensitivity level. Network operators design their systems with an additional margin to penetrate deep within buildings and to account for signal fading. Therefore, the locations within a network where signal levels are low make up a small percentage of the total coverage area – typically less than 5% of the area.

Second, the AWS-4 system would similarly be designed such that only a small percentage of the area would receive low coverage. The device would only need to transmit at its maximum power when necessary to close the loop to the base station, which would represent approximately

5% of the area. The probability, then, that the AWS-4 system would experience low coverage at the same instant that the H Block device would receive low coverage would be the product of their probabilities, or 0.25%, a very low likelihood.[4] Thus, this low probability of UE-to-UE interference must be taken into account in establishing an appropriate OOBE limit for AWS-4 mobile terminals.

Finally intra-system interference, density of devices, and the probability of packet collisions also must be taken into account, and even in the low probability event that interference does occur, LTE provides adaptive modulation and also hybrid automatic repeat request techniques which do not cause a loss of service and also further prevent any noticeable impact to the user.

Industry Studies Support -30 dBm/MHz or Higher Emissions Limits

Numerous industry studies, including the following, support an OOBE limit of -30 dBm/MHz or higher for LTE devices: (1) a January 2009 report published by the Electronics Communications Committee of the European Conference of Postal and Telecommunications Administrations ("ECC Report");[5] (2) a January 2012 3GPP contribution submitted by Qualcomm (and supported by Sprint Nextel Corporation ("Sprint")) ("Qualcomm Study");[6] and (3) a January 2012 3GPP contribution submitted by Intel regarding Band 26 UE emissions in the 700 MHz band ("Intel Band 26/APAC700 Study").[7] These studies all recognized the probabilistic nature of device-to-device interference as noted above and performed Monte Carlo simulations to ascertain the probability of interference occurring under different system configurations.

First, the ECC Report analyzed the probability and magnitude of interference between a device transmitter and device receiver with 5 MHz of frequency separation, under a range of scenarios. Realistic factors, including intra-system interference, density of devices, and the probability of packet collisions, were analyzed. For a worst-case situation of base stations separated by 100 meters, the report concluded that "*where the probability of collision between victim and interferer packets is taken into account, a TS BEM baseline level of -22.5 dBm/MHz can be justified*."[8] In other words, in the case of device transmit and receive separated by 5 MHz, an

[4] In practice, the probability of low-coverage areas aligning depends on the system deployment approach. If H Block and AWS-4 base stations are co-located on all of the same sites and employ the same sector orientation, then the low coverage areas would align. Such perfect coordination among different operators, however, is not typical.

[5] *See Derivation of a Block Edge Mask (BEM) for Terminal Stations in the 2.6 GHz Frequency Band (2500-2690 MHz)*, ECC Report 131 (Jan. 2009) ("ECC Report"), *available at* http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP131.PDF.

[6] *See* 3GPP TSG RAN WG4 R4-B26ah-0009, *Results of Monte Carlo Simulations for Band 26 Coexistence Scenarios*, Qualcomm, Incorporated (Jan. 17-19, 2012) ("Qualcomm Study"), *available at* http://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_AHs/R4_AH_Band-26/Docs/R4-B26ah-0009.zip.

[7] *See* 3GPP TSG RAN WG4 R4-B26ah-0035, *Band 26 UE Spurious Emission on 850 MHz Lower Band (Band 27)*, Intel Corporation (Jan. 17-19, 2012) ("Intel Band 26/APAC700 Study"), *available at* http://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_AHs/R4_AH_Band-26/Docs/R4-B26ah-0035.zip.

[8] ECC Report at 28.

emissions level of -22.5 dBm/MHz was deemed sufficient to protect the device receiver under a worst-case scenario that accounts for the low probability of device-to-device interference.

Second, the Qualcomm Study examined acceptable emissions levels from LTE devices in Band 26, which is the 850 MHz specialized mobile radio ("SMR") band employed by Sprint. The study conducted Monte Carlo simulations of the potential interference from Sprint LTE devices to Public Safety devices operating 2 MHz away, above 851 MHz.[9] Notably, the Qualcomm Study demonstrated that "*an OOB limit in the order of -47 dBm/6.25kHz [or -25 dBm/MHz] is sufficient to protect PSNB [public safety narrowband] portables from LTE UL interference*."[10] The study further noted that, at an OOBE limit of -25 dBm/MHz, the "*probability of interference is not relevant to all active PSNB portables … i.e., only 1% or 2% of the total active portables … are subject to a probability of interference of 1%*."[11] In other words, at an OOBE limit of -25 dBm/MHz, the Qualcomm Study found that the probability of interference is merely 0.1% to 0.2%. Moreover, under more realistic conditions with a probability of interference higher than 0.2%, the study concluded that "*the OOB limit -42 dBm/6.25 kHz [or -20 dBm/MHz] will be sufficient*."[12]

Third, the Intel Band 26/APAC700 Study provided Monte Carlo simulations of the probability of interference from Band 26 to the nearby 700 MHz band. The study concluded that the "*results indicate that when the UE spurious emission is at -27dBm/MHz, the cell edge throughput loss is at 1% with aggressor system's required data rate of about 500 kbps.*"[13] This limit of -27 dBm/MHz is based upon a worst-case scenario that assumes that (i) the UE transmitter is constantly transmitting video signals; and (ii) the UE receiver is operating at the highest data rate.[14] These assumptions, however, do not reflect real-world conditions, which, if taken into account, would support an even higher limit than -27 dBm/MHz.

In short, multiple simulations conducted by a variety of organizations arrived at the same conclusion. These simulations demonstrate that a device emission limit of -22.5 to -27 dBm/MHz is sufficient to protect nearby device receivers. Based on these studies, DISH concludes that the more stringent limit of -30 dBm/MHz provides more than sufficient interference protection to future H Block devices.[15]

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[9] Narrowband Public Safety systems typically offer voice services, are used for emergencies, and are designed to operate in a noise-limited environment. Thus, they are more susceptible to interference than broadband wireless data systems, particularly LTE systems, which are packet-based and employ hybrid automatic repeat request techniques.

[10] Qualcomm Study at 11.

[11] *Id.*

[12] *Id.*

[13] Intel Band 26/APAC700 Study at 10.

[14] *See id.* at 5.

[15] Furthermore, the Commission's rules permit substantially higher OOBE limits for other wireless services. *See, e.g.*, 47 C.F.R. § 24.238 (OOBE attenuation limit of 43+10*log10(P) dB for broadband

An H Block OOBE Limit of -49 dBm/MHz at 2005 MHz Is Required to Protect AWS-4

Finally, DISH urged the Commission, in any separate H Block service rules proceeding, to adopt an OOBE limit of -49 dBm/MHz at 2005 MHz for H Block base stations in order to protect AWS-4 operations. The unwanted emissions from the H Block transmitter would fall in-band to the AWS-4 receiver, and must be filtered at the transmitter in order to protect the AWS-4 receiver. Adopting a limit of -49 dBm/MHz above 2005 MHz would provide clear notice to H Block auction participants of the required transmitter filter performance. Additionally, an OOBE limit of -49 dBm/MHz would not impose a stringent filter requirement because the limit would be set at 2005 MHz—5 MHz away from the edge of the H Block. This level may be achieved without additional stringent filtering on existing 3GPP base station designs for the H Block, and hence it is not a burden on any future H Block operator.

Base station-to-base station interference should be treated differently from device-to-device interference. As described above, devices are inherently mobile, and thus interference is highly probabilistic, with a low likelihood of interference given the many variables involved. Base stations, on the other hand, are at fixed locations. If two base stations are built in a manner such that one base station interferes with the second base station, then the resulting interference will be ever-present. Therefore, base station interference is calculated using a deterministic process, evaluating receiver desensitization as a function of the level of interference present in the channel.

As an example, in a 2011 3GPP contribution, Alcatel-Lucent referenced the spurious emissions specification of -49 dBm/MHz as applicable to a transmitter's emissions level within nearby base station receive blocks:

> "*Currently, the BS spurious emissions limits for co-existence (in the same geographical area) with BS operating in other frequency bands is specified as -49 dBm/MHz in the UL frequency range of the operating band of the coexisted BS. This requirement value is obtained assuming a 67 dB BS to BS minimum coupling loss (MCL) and a 0.8 dB victim BS receiver desensitization.*"[16]

In general, meeting the -49dBm/MHz OOBE limit for the H Block operator at 5 MHz away is a much more relaxed requirement than the AWS-4 operator meeting -30 dBm/MHz at the band edge with 0 MHz offset. DISH is willing to create a 5 MHz internal terrestrial guard band under

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PCS); 47 C.F.R. § 27.53(c) (OOBE attenuation limit of 43+10*log10(P) dB for upper 700 MHz C block); 47 C.F.R. § 27.53(d) (OOBE attenuation limit of 43+10*log10(P) dB for upper 700 MHz D block emissions between 775-788 MHz, above 805 MHz, and below 758 MHz); 47 C.F.R. § 27.53(g) (OOBE attenuation limit of 43+10*log10(P) dB for lower 700 MHz A, B, and C blocks); 47 C.F.R. § 90.691(a)(2) (OOBE attenuation limit of 43+10*log10(P) dB for economic area-based SMR systems in the 809-824 and 851-869 MHz bands).

[16] *See* 3GPP TSG RAN WG4 R4-113985, *BS to BS Coexistence Between Band 12/17 and Additional New 716-728 Downlink*, Alcatel-Lucent (August 22-26, 2011), *available at* http://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_60/docs/R4-113985.zip.

the conditions set forth above in order to be able to meet this requirement, and also to provide a solution that does not require reopening the Band 23 chipset specifications.

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In sum, DISH believes that its modified technical proposal offers a reasonable compromise solution where DISH would effectively sacrifice 5 MHz of its uplink spectrum for terrestrial use to address the Commission's desire to ensure flexibility in the future use of the H Block, while also addressing DISH's desire to be able to use its remaining 15 MHz of uplink spectrum to the maximum extent possible and as quickly as possible.

Respectfully submitted,

/s/ Jeffrey H. Blum

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